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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/068,819	02/05/2002	Ford Grigg	01-0371	8861

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EXAMINER

MCHENRY, KEVIN L

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 05/07/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/068,819

Applicant(s)

GRIGG ET AL.

Examiner

Kevin L McHenry

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-52 is/are pending in the application.
- 4a) Of the above claim(s) 1-31 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 32-52 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☒ Claim(s) 1-52 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-31, drawn to a flux for external contact on a semiconductor component, classified in class 148, subclass 24.
- II. Claims 32-52, drawn to a system for bonding external contacts to semiconductor components, classified in class 228, subclass 33.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions II and I are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the combination does not require the shape of a flux droplet, that the flux masks a trace, that the flux have a specific viscosity, or that a curing agent cures within a temperature range. The subcombination has separate utility such as metal casting or metal refining.
3. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with Stephen Gratton on 22 April 2003 a provisional election was made with traverse to prosecute the invention of Group II, claims 32-52. Affirmation of this election must be made by applicant in replying to this

Office action. Claims 1-31 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 39 and 46-52 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 39 recites the limitation "the solder ball" in line 3 of claim 39. There is insufficient antecedent basis for this limitation in the claim. For examination purposes the examiner interpreted this language to mean "a solder ball".

9. Claim 46 recites the limitation "the external contact" in line 7 of claim 46. There is insufficient antecedent basis for this limitation in the claim. For examination purposes the examiner interpreted this language to mean "the solder ball".

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 32-40 and 46-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. (U.S.P. 6,402,013) in view of Glenn et al. (U.S.P. 5,482,736).

Abe et al. teach a soldering process for electronic components such as semiconductor packages that uses a flux (see U.S.P. 6,402,013; particularly column 1, lines 5-11; column 3, lines 63-67; column 4, line 1). The flux includes a polymer epoxy resin, a fluxing agent such as a carboxylic acid or carboxylic acid anhydride, and a curing agent such as a solvent or reactant. The resin would be electrically insulative. Particularly, ethylene glycol is a solvent that will cross-link with epoxies and carboxylic acid anhydride is a reactant that will serve as a curing agent. Abe et al. teach that the curing agent and the fluxing agent can be the same chemical, such as when carboxylic acid anhydride is used (see U.S.P. 6,402,013; particularly column 2, lines 1-60; column 5, lines 8-40, 47-60; column 6, lines 1-14, 25-48; for information on solvents acting as epoxy curing agents, see U.S.P. 5,851,311; particularly column 3, lines 1-8; column 6, lines 55-66). Abe et al. teach that this flux can be used with solder balls or can be mixed with a solder powder to form a solder paste. The flux is viscous and is applied by screen printing or transfer to a location to be soldered. The paste can be applied by a means

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such as screen printing. After application of the flux or paste, solder reflow is performing through appropriate means (see U.S.P. 6,402,013; particularly column 4, lines 15-39; column 7, lines 3-6, 15-19, 55-61).

Abe et al. do not teach that the electronic components have contact pads, a mechanism for placement of the solder balls, that reflow is performed in a furnace, or the thickness of the solder droplet on the contact pads.

Glenn et al. teach a soldering method for electronic components in which solder flux is applied to a package to form a droplet on the surface of contact pads. A ball transfer mechanism, such as a jig, is used to place solder balls on the solder droplets (see U.S.P. 5,482,736; particularly Figures 1, 3, and 9; column 1, lines 5-10; column 3, lines 27-67). The droplets support the balls and have a thickness between one tenth to one half the diameter of the solder ball. Glenn et al. teach that a furnace can be used for solder reflow (see U.S.P. 5,482,736; particularly Figure 3; column 3, lines 64-67).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the process of Abe et al. by the teachings of Glenn et al. One would have been motivated to do so in order to provide a furnace as a reflow means, as taught by Glenn et al., and to use a jig as a solder ball transfer mechanism, as taught by Glenn et al. One of ordinary skill in the art would have been motivated to provide contact pads on the semiconductor package in order to provide means for an electronic connection between the package and mounted devices.

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12. Claims 41-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. (U.S.P. 6,402,013) in view of Soderlund et al. (U.S.P. 5,611,476) and Glenn et al. (U.S.P. 5,482,736).

Abe et al. teach a soldering process for electronic components such as semiconductor packages that uses a flux (see U.S.P. 6,402,013; particularly column 1, lines 5-11; column 3, lines 63-67; column 4, line 1). The flux includes a polymer epoxy resin, a fluxing agent such as a carboxylic acid or carboxylic acid anhydride, and a curing agent such as a solvent or reactant. The resin would be electrically insulative. Particularly, ethylene glycol is a solvent that will cross-link with epoxies and carboxylic acid anhydride is a reactant that will serve as a curing agent. Abe et al. teach that the curing agent and the fluxing agent can be the same chemical, such as when carboxylic acid anhydride is used (see U.S.P. 6,402,013; particularly column 2, lines 1-60; column 5, lines 8-40, 47-60; column 6, lines 1-14, 25-48; for information on solvents acting as epoxy curing agents, see U.S.P. 5,851,311; particularly column 3, lines 1-8; column 6, lines 55-66). Abe et al. teach that this flux can be used with solder balls or can be mixed with a solder powder to form a solder paste. The flux is viscous and is applied by screen printing or transfer to a location to be soldered. The paste can be applied by a means such as screen printing. After application of the flux or paste, solder reflow is performing through appropriate means (see U.S.P. 6,402,013; particularly column 4, lines 15-39; column 7, lines 3-6, 15-19, 55-61).

Abe et al. do not teach that the electronic components have contact pads, that reflow is performed in a furnace, or that a conveyor is used to move the component.

Soderlund et al. teach a solder reflow furnace with a conveyor for moving component between furnace zones. Soderlund et al. teach that this furnace will minimize the buildup of condensed flux and solvent on components within the furnace (see U.S.P. 5,611,476; particularly column 1, lines 7-8, 60-63; column 4, lines 1-10).

Glenn et al. teach a soldering method for electronic components in which solder flux is applied to a package to form a droplet on the surface of contact pads. A ball transfer mechanism, such as a jig, is used to place solder balls on the solder droplets (see U.S.P. 5,482,736; particularly Figures 1, 3, and 9; column 1, lines 5-10; column 3, lines 27-67). The droplets support the balls and have a thickness between one tenth to one half the diameter of the solder ball. Glenn et al. teach that a furnace can be used for solder reflow (see U.S.P. 5,482,736; particularly Figure 3; column 3, lines 64-67).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the process of Abe et al. by the teachings of Soderlund et al. and Glenn et al. One would have been motivated to use the furnace of Soderlund et al. in order to provide a reflow means that minimized the buildup of condensed flux and solvent on components within the furnace. One would have been motivated to do so in order to provide a furnace as a reflow means, as taught by Glenn et al., and to use a jig as a solder ball transfer mechanism, as taught by Glenn et al. One of ordinary skill in the art would have been motivated to provide contact pads on the semiconductor package in order to provide means for an electronic connection between the package and mounted devices.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Diamant et al. (U.S.P. 5,851,311), Nishina et al. (U.S. 2003/0051770), Diamant et al. (U.S.P. 5,989,362), Pendse (U.S.P. 6,059,894), Takemoto et al. (U.S.P. 5,211,763), Arita et al. (U.S.P. 5,417,771), Diep-Quang (U.S.P. 5,904,782),


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin L McHenry whose telephone number is (703) 305-9626. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G Dunn can be reached on (703) 308-3318. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



April 29, 2003



M. ALEXANDRA ELVE
PRIMARY EXAMINER